1. An airfoil comprising:

a frontal surface that leads through a fluid;

an first surface relating with said frontal surface that receives fluid flow thereon;

a second surface opposite said first surface and relating with said frontal surface, said second surface also receiving fluid thereon;

a airfoil tip relating to said first and second surfaces that releases fluid from said airfoil; and

at least one fluid flow regulator featured and operable with said first surface, said fluid flow regulator comprising a leading edge, a trailing edge, and a pressure recovery drop extending between said leading and trailing edges to form a down step, said pressure recovery drop comprising at least one drop face of a calculated height formed therein, said fluid flow regulator functioning to optimize air flow, reduce separation of said fluid over said first surface of said airfoil, and reduce induced noise.

2. The airfoil of claim 1, further comprising at least one fluid flow regulator featured and operable with said second surface.

3. The airfoil of claim 1, wherein said fluid flow regulator is integrally formed with said first surface.

4. The airfoil of claim 1, wherein said fluid flow regulator is removably attached to said first surface.

5. The airfoil of claim 1, wherein said fluid flow regulator is positioned in an orientation selected from the group consisting of perpendicular to the direction of flow of said fluid, substantially perpendicular to the direction of flow of said fluid, on an angle with respect to said direction of flow of said fluid, parallel or substantially parallel to the direction of flow of said fluid, and any combination of these.

6. The airfoil of claim 1, wherein said fluid flow regulator comprises a formation selected from the group consisting of linear, curved, spline, and any combination of these.

7. The airfoil of claim 1, wherein said fluid flow regulator is positioned at or proximate an optimal pressure recovery point at which point there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said airfoil, which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

8. The airfoil of claim 1, wherein said fluid flow regulator comprises a dynamic fluid flow regulator that functions to vary the height of said at least one drop face.

9. The airfoil of claim 8, wherein said dynamic fluid flow regulator inconsistently varies the height of said drop face along the length of said pressure recovery drop.

10. The airfoil of claim 1, wherein said fluid flow regulator comprises means for effectuating vector positioning about said airfoil.

11. The airfoil of claim 1, wherein said pressure recovery drop comprises an orthogonal design.

12. The airfoil of claim 1, wherein said first and second surfaces comprise a plurality of said fluid flow regulators.

13. The airfoil of claim 1, wherein said airfoil is selected from the group consisting of a fan blade, a rotor, a turbine blade, a blower blade, an impeller, a propeller, and any other similar airfoils.

14. The airfoil of claim 1, further comprising a sub-atmospheric barrier that is suddenly generated as said fluid encounters and flows over said pressure recovery drop, said sub-atmospheric barrier comprising a low pressure area of fluid molecules having decreased kinetic energy that serve as a cushion between said higher kinetic energy fluid molecules in said fluid and the molecules at said surface to facilitate laminar flow and assist in the reduction of the separation potential of said fluid.

15. A hydrofoil comprising:

a frontal surface that leads through a liquid;

an first surface relating with said frontal surface that receives liquid flow thereon;

a second surface opposite said first surface and relating with said frontal surface, said second surface also receiving said liquid thereon;

a hydrofoil tip relating to said first and second surfaces that releases said liquid from said hydrofoil; and

at least one fluid flow regulator featured and operable with said first surface, said fluid flow regulator comprising a leading edge, a trailing edge, and a pressure recovery drop extending between said leading and trailing edges to form a down step, said pressure recovery drop comprising at least one drop face of a calculated height formed therein, said fluid flow regulator functioning to optimize liquid flow, reduce separation of said liquid over said first surface of said hydrofoil, and reduce induced noise.

16. The hydrofoil of claim 15, further comprising at least one fluid flow regulator featured and operable with said second surface.

17. The hydrofoil of claim 15, wherein said fluid flow regulator is integrally formed with said first surface.

18. The hydrofoil of claim 15, wherein said fluid flow regulator is removably attached to said first surface.

19. The hydrofoil of claim 15, wherein said fluid flow regulator is positioned in an orientation selected from the group consisting of perpendicular to the direction of flow of said liquid, substantially perpendicular to the direction of flow of said liquid, on an angle with respect to said direction of flow of said liquid, parallel or substantially parallel to the direction of flow of said liquid, and any combination of these.

20. The hydrofoil of claim 15, wherein said fluid flow regulator comprises a formation selected from the group consisting of linear, curved, spline, and any combination of these.

21. The hydrofoil of claim 15, wherein said fluid flow regulator is positioned at or proximate an optimal pressure recovery point as the location(s) about said surface at which there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said hydrofoil, which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

22. The hydrofoil of claim 15, wherein said fluid flow regulator comprises a dynamic fluid flow regulator that functions to vary the height of said at least one drop face.

23. The hydrofoil of claim 22, wherein said dynamic fluid flow regulator inconsistently varies the height of said drop face along the length of said pressure recovery drop.

24. The hydrofoil of claim 15, wherein said fluid flow regulator comprises means for effectuating vector positioning about said hydrofoil.

25. The hydrofoil of claim 15, wherein said pressure recovery drop comprises an orthogonal design.

26. The hydrofoil of claim 15, wherein said first and second surfaces comprise a plurality of said fluid flow regulators.

27. The hydrofoil of claim 15, wherein said hydrofoil is selected from the group consisting of a fan blade, a rotor, a turbine blade, an impeller, a propeller, and any other similar hydrofoils.

28. The hydrofoil of claim 15, further comprising a sub-atmospheric barrier that is suddenly generated as said liquid encounters and flows over said pressure recovery drop, said sub-atmospheric barrier comprising a low pressure area of liquid molecules having decreased kinetic energy that serve as a cushion between said higher kinetic energy liquid molecules in said liquid and the molecules at said surface to facilitate laminar flow and assist in the reduction of the separation potential of said liquid.

29. A fan blade connected to a central hub as part of a fan, said fan blade comprising:

a frontal fan blade surface that leads through a fluid;

a fan blade pressure surface relating with said frontal fan blade surface that receives fluid flow thereon;

a fan blade suction surface opposite said fan blade pressure surface that also receives fluid thereon;

at least one fluid flow regulator featured and operable with either or both of said fan blade pressure and suction surfaces, said fluid flow regulator comprising:

a leading surface;

a trailing surface;

a pressure recovery drop extending a pre-determined distance between said leading and trailing edges to form a down step, said pressure recovery drop comprising at least one drop face of a calculated height formed therein, said fluid flow regulator functioning to regulate existing pressure gradients along said fan blade to optimize and equalize said fluid flow and to reduce the separation potential of said fluid, wherein said regulation of said pressure gradients positively influences the flow properties and behavior of said fluid across said fan blade, and the performance of said fan;

a sub-atmospheric barrier that is generated as said fluid encounters and flows over said pressure recovery drop, said sub-atmospheric barrier comprising a low pressure area of fluid molecules having

decreased kinetic energy that serve as a cushion between said higher kinetic energy fluid molecules in said fluid and the molecules at said surface to facilitate laminar flow and assist in the reduction of the separation potential of said fluid; and

a trailing edge that defines and extends from the base of said pressure recovery drop that provides a trailing flow boundary for said fluid.

30. The fan blade of claim 29, wherein said pressure recovery drop is positioned at or proximate an optimal pressure recovery point defined as the location(s) about said surface at which there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said fan blade, which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

31. A turbine vane connected to a central hub as part of a turbine, said turbine vane comprising:

a frontal turbine vane surface that leads through a fluid;

a turbine vane pressure surface relating with said frontal turbine vane surface that receives fluid flow thereon;

a turbine vane suction surface opposite said turbine vane pressure surface that also receives fluid thereon;

at least one fluid flow regulator featured and operable with either or both of said turbine vane pressure and suction surfaces, said fluid flow regulator comprising:

a leading surface;

a trailing surface;

a pressure recovery drop extending a pre-determined distance between said leading and trailing surfaces to form a down step, said pressure recovery drop comprising at least one drop face of a calculated height formed therein, said fluid flow regulator functioning to regulate existing pressure gradients along said turbine blade to optimize and equalize said fluid flow and to reduce the separation potential of said fluid, wherein said regulation of said pressure gradients positively influences the flow properties and behavior of said fluid across said turbine blade, and the performance of said turbine;

a sub-atmospheric barrier that is generated as said fluid encounters and flows over said pressure recovery drop, said sub-atmospheric barrier comprising a low pressure area of fluid molecules having decreased kinetic energy that serve as a cushion between said higher kinetic energy fluid molecules in said fluid and the molecules at said surface to facilitate laminar flow and assist in the reduction of the separation potential of said fluid; and

a trailing edge that defines and extends from the base of said pressure recovery drop that provides a trailing flow boundary for said fluid.

32. The turbine blade of claim 31, wherein said pressure recovery drop is positioned at or proximate an optimal pressure recovery point defined as the location(s) about said surface at which there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said turbine blade, which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

33. A rotor blade connected to a mast as part of a rotor system, said rotor blade comprising:

a frontal rotor blade surface that leads through a fluid;

a first rotor blade surface relating with said frontal rotor blade surface that receives fluid flow thereon;

a rotor blade second surface opposite said first rotor blade surface that also receives fluid thereon;

at least one fluid flow regulator featured and operable with either or both of said first and second rotor blade surfaces, said fluid flow regulator comprising:

a leading surface;

a trailing surface;

a pressure recovery drop extending a pre-determined distance between said leading and trailing surfaces to form a down step, said pressure recovery drop comprising at least one drop face of a calculated height formed therein, said fluid flow regulator functioning to regulate existing pressure gradients along said rotor blade to optimize and equalize said fluid flow and to reduce the separation potential of said fluid, wherein said regulation of said pressure gradients positively influences the flow properties and behavior of said fluid across said rotor blade, and the performance of said rotor system;

a sub-atmospheric barrier that is generated as said fluid encounters and flows over said pressure recovery drop, said sub-atmospheric

barrier comprising a low pressure area of fluid molecules having decreased kinetic energy that serve as a cushion between said higher kinetic energy fluid molecules in said fluid and the molecules at said surface to facilitate laminar flow and assist in the reduction of the separation potential of said fluid; and

a trailing edge that defines and extends from the base of said pressure recovery drop that provides a trailing flow boundary for said fluid.

34. The rotor blade of claim 33, wherein said pressure recovery drop is positioned at or proximate an optimal pressure recovery point defined as the location(s) about said surface at which there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said rotor blade, which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

35. An impeller blade connected to a central hub as part of an impeller, said impeller blade comprising:

a frontal impeller blade surface that leads through a fluid

an impeller blade pressure surface relating with said frontal impeller blade surface that receives fluid flow thereon;

an impeller blade suction surface opposite said impeller blade pressure surface that also receives fluid thereon;

at least one fluid flow regulator featured and operable with either or both of said impeller blade pressure and suction surfaces, said fluid flow regulator comprising:

a leading surface;

a trailing surface;

a pressure recovery drop extending a pre-determined distance between said leading and trailing surfaces to form a down step, said pressure recovery drop comprising at least one drop face of a calculated height formed therein, said fluid flow regulator functioning to regulate existing pressure gradients along said impeller blade to optimize and equalize said fluid flow and to reduce the separation potential of said fluid, wherein said regulation of said pressure gradients positively influences the flow properties and behavior of said fluid across said impeller blade, and the performance of said impeller;

a sub-atmospheric barrier that is generated as said fluid encounters and flows over said pressure recovery drop, said sub-atmospheric barrier comprising a low pressure area of fluid molecules having decreased kinetic energy that serve as a cushion between said higher kinetic energy fluid molecules in said fluid and the molecules at said surface to facilitate laminar flow and assist in the reduction of the separation potential of said fluid; and

a trailing edge that defines and extends from the base of said pressure recovery drop that provides a trailing flow boundary for said fluid.

36. The impeller blade of claim 35, wherein said pressure recovery drop is positioned at or proximate an optimal pressure recovery point defined as the location(s) about said surface at which there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said impeller blade, which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

37. A propeller blade connected to a central hub as part of a propeller, said propeller blade comprising:

a frontal propeller blade surface that leads through a fluid;

a propeller blade pressure surface relating with said frontal propeller blade surface that receives fluid flow thereon and that is connected to and extends from a central rotating hub;

a propeller blade suction surface opposite said pressure surface;

at least one fluid flow regulator featured and operable with either or both of said pressure and suction surfaces, said fluid flow regulator comprising:

a leading surface;

a trailing surface;

a pressure recovery drop extending a pre-determined distance between said leading and trailing surfaces to form a down step, said pressure recovery drop comprising at least one drop face of a calculated height formed therein, said fluid flow regulator functioning to regulate existing pressure gradients along said propeller blade to optimize and equalize said fluid flow and to reduce the separation potential of the fluid, wherein said regulation of said pressure gradients positively influences the flow properties and behavior of said fluid across said propeller blade, and the performance of said propeller;

a sub-atmospheric barrier that is generated as said fluid encounters and flows over said pressure recovery drop, said sub-atmospheric

barrier comprising a low pressure area of fluid molecules having decreased kinetic energy that serve as a cushion between said higher kinetic energy fluid molecules in said fluid and the molecules at said surface to facilitate laminar flow and assist in the reduction of the separation potential of said fluid; and

a trailing edge that defines and extends from the base of said pressure recovery drop that provides a trailing flow boundary for said fluid.

38. The propeller blade of claim 37, wherein said pressure recovery drop is positioned at or proximate an optimal pressure recovery point defined as the location(s) about said surface at which there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said propeller blade, which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

39. An airfoil or hydrofoil having improved fluid flow thereon and comprising:

an upper and lower surface; and

at least one fluid flow regulator featured in said upper and lower surface, said fluid flow regulator comprising a pressure recovery drop having at least one drop face formed therein, said fluid flow regulator functioning to regulate pressure gradients and optimize fluid flow over said surface of said airfoil or hydrofoil.

41. A method for influencing fluid flow over a surface of a foil and for influencing the rate and magnitude of pressure recovery along said surface, said method comprising the steps of:

featuring at least one fluid flow regulator with one or more surfaces of a foil, said fluid flow regulator comprising:

a pressure recovery drop having at least one drop face formed therein, said drop face comprising a calculated height;

a sub-atmospheric barrier generated at the base of said drop face as said fluid encounters said pressure recovery drop;

subjecting said foil to a fluid, such that said fluid is caused to move about said foil; and

causing said fluid to encounter said fluid flow regulator, such that said pressure recovery drop induces a sudden drop in pressure as said fluid flows over said fluid flow regulator, wherein a sub-atmospheric barrier is created at the base of said drop face, said fluid flow regulator functioning to regulate pressure gradients and optimize fluid flow about said foil, thus increasing the performance of said foil in said fluid.

42. The method of claim 41, wherein said step of featuring comprises the step of positioning said fluid flow regulator at an optimal pressure recovery point defined as the location(s) about said surface at which there is an imbalanced or unequal pressure gradient forward and aft of said fluid, thus creating an adverse pressure about said foil,

which adverse pressure gradient induces friction and pressure drag that ultimately increases the separation potential of said fluid.

43. The method of claim 42, further comprising the step of repositioning said fluid flow regulator as said optimal pressure recovery points change in response to varying conditions surrounding said fluid flow.

44. The method of claim 41, further comprising the step of varying said pressure recovery drop, and particularly said height of said drop face, in response to changing conditions.

45. The method of claim 41, wherein said step of causing said fluid to encounter said fluid flow regulator has the effect of optimizing fluid flow and the performance of said foil within said fluid, said fluid flow regulator:

regulating the pressure gradients that exist along said surface by reducing the pressure drag at various locations along said surface, as well as the pressure drag induced forward and aft of said foil, via a pressure recovery drop;

increasing pressure recovery and pressure recovery potential as a result of regulating said pressure gradients and reducing said pressure drag;

reducing friction drag along said surface as a result of increasing said pressure recovery; and

decreasing fluid separation and fluid separation potential as a result of said reducing friction drag.

46. The method of claim 41, wherein said foil comprises a structure selected from the group consisting of an airfoil, a hydrofoil, a propeller blade, a fan blade, a rotor, a rotor blade, an impeller vane, a turbine vane, and any similar structures.

47. A method for reducing noise caused by fluid flowing over an object, said method comprising the steps of:

obtaining an object having one or more surfaces subject to fluid flow;

featuring at least one fluid flow regulating device in said surface, said fluid flow regulating device comprising:

a pressure recovery drop having at least one drop face formed therein, said drop face comprising a calculated height;

a sub-atmospheric barrier generated at the base of said drop face as said fluid encounters said pressure recovery drop;

subjecting said object to a fluid, such that said fluid is caused to move about said object; and

causing said fluid to encounter and pass over said fluid flow regulator, such that said pressure recovery drop induces a sudden drop in pressure as said fluid flows over said fluid flow regulator, wherein a sub-atmospheric barrier is created at the base of said drop face, said fluid flow regulator functioning to regulate pressure gradients and optimize fluid flow about said object, thus increasing the performance of said object in said fluid and reducing the noise induced by said object in said fluid.